MA23203, Michaelmas Term Examination 2019
Syllabus of Examinable Material

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General Remarks

The lists below specify particular results (lemmas, propositions, theorems, corollaries) that candidates are expected to know and produce at the examination. In some cases the result is specified as "statement only": in such cases candidates will not be asked to give proofs on the examination paper. Where proofs are examined, it is not expected that candidates reproduce a verbatim reproduction of a proof in the printed notes. If asked to prove a result, any valid proof (within the framework of the module) is acceptable. Indeed candidates, in preparing for the examination, may decide to focus on the key steps within a particular proof, with confidence that they can complete the proof on the basis of their general competence, combined with an overview of the basic strategy and significant steps of the proof. If another numbered result is needed as a prerequisite for a given proof, it can normally be presumed that the prerequisite result can be stated without proof. If a proof were expected of a prerequisite result, then the examination paper would have been drafted to explicitly require that proof in a previous part of the question.

Section 1

The results of this section are *non-examinable*. Candidates should however be familiar with results from this section to the extent that they are referenced and applied in subsequent sections.

Section 2

Candidates should be familiar with the definition of *limit points* and of *convergence* and *limits* of infinite sequences of points in Euclidean spaces.

The following results and proofs are examinable:—

Proposition 2.1	(statement only)
Proposition 2.2	(statement only)
Lemma 2.3	
Theorem 2.6	(statement only)

Section 3

Candidates should be familiar with the definition of open and closed sets in subsets of Euclidean spaces. (In other words, given a subset X of a Euclidean space, candidates should be able to define what is meant to say that subset of X is *open* in X, or *closed* in X. Note that X may in some cases be the whole Euclidean space.)

Candidates should in particular be prepared to investigate specified subsets of Euclidean spaces in order to determine whether or not they are open in that space, and whether or not they are closed in that space.

The following results and proofs are examinable:—

Lemma 3.1	
Lemma 3.2	
Proposition 3.3	
Lemma 3.5	
Proposition 3.6	(statement only)
Lemma 3.7	

Section 4

Candidates should be familiar with, and be able to formally state, the principal definitions in this section, including the definition of a *limit* of function of several real variables, and the definition of *continuity* for such a function.

The following results and proofs are examinable:—

Lemma 4.1
Lemma 4.2
Proposition 4.7
Proposition 4.8
Proposition 4.9
Proposition 4.10
Proposition 4.11
Proposition 4.12
Proposition 4.18
Proposition 4.20
Theorem 4.21

Section 5

There is no examinable material in this section.

Section 6

Candidates should be familiar with the principal definitions in this section, including the definitions of *partition*, *upper* and *lower sums*, *upper* and *lower Riemann integrals*, *Riemann-integrability* and the *Riemann integral*.

The following results and proofs are examinable:—

Lemma 6.1	(statement only)
Lemma 6.2	
Lemma 6.3	
Proposition 6.4	(statement only)
Proposition 6.5	
Proposition 6.10	(statement only)
Proposition 6.11	
Theorem 6.13	
Theorem 6.14	

Section 7

There is no examinable material in this section.

Section 8

The following results and proofs are examinable:—

Theorem 8.1	(statement only)
Theorem 8.2	(statement only)
Lemma 8.10	
Theorem 8.11	
Proposition 8.13	
Proposition 8.16	

Section 9

Candidates should be familiar with the definition of differentiability for functions of several real variables given in subsection 9.4.

Candidates should be able to investigate real-valued functions of several real variables, such as those considered in subsection 9.1, to determine whether or not they are continuous, and whether or not they are differentiable at specified points.

The following results and proofs are examinable:—

Lemma 9.1
Proposition 9.2
Corollary 9.3
Corollary 9.4
Proposition 9.5
Corollary 9.6
Proposition 9.13
Proposition 9.16
Proposition 9.18
Proposition 9.19

Section 10

There is no examinable material in this section.

Section 11

The following results and proofs are examinable:—

Theorem 11.1